1.) Let \( f(x) = \begin{cases} \frac{(x+3)(9x^2-1)}{x^2-4} & \text{if } x \leq 5 \\ x^2 - 4 & \text{if } x > 5 \end{cases} \)

a.) (3 points) Find the vertical asymptotes.
b.) (4 points) Find the horizontal and oblique asymptotes.
c.) (3 points) Find the x- and y-intercepts.
d.) (3 points) Graph \( f \).

2.) Let \( f(x) = 9x^3 + 11x^2 + 36x + 44 \).

a.) (3 points) Use Descartes’s Rule of Signs to show \( f \) has no positive roots.
b.) (2 points) Use the IVT to show \( f \) has a zero between \( a=-2 \) and \( b=-1 \).
c.) (4 points) Use the rational roots theorem to find a rational root of \( f \) between \( a=-2 \) and \( b=-1 \).
d.) (4 points) Factor \( f \) completely and find all x-intercepts.

3.) (8 points) Find the inverse of \( f(x) = \frac{x-7}{x+9} \).

4.) (7 points each) Find the exact value without using a calculator.

\[ 6\log_{25} \frac{10}{3} + \log_{5} 27 - 3\log_{5} 2 \]

5.) (7 points each) Solve.

a.) \( \log_{5}(3x - 2) + \log_{5}(x + 1) = 1 \)

b.) \( 2^{-7x-3} = 5^{x+2} \)

6.) (15 points) Solve system using an augmented matrix.

\[
\begin{cases}
3x + 5y + 2z = 1 \\
5x + 3y + 5z = 9 \\
7x + 6y + z = 0
\end{cases}
\]

7.) (15 points) Write decimal as a fraction in lowest terms.

\( .0127 \)

8.) (15 points) Write the sum of the numbers between 30 and 595 which are divisible by 13 using summation notation then find the sum.